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Organizational Information Technology Norms and IT Quality

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ABSTRACT

Belief systems, long recognized as a key component of managerial control, play an important role in IT success. Organizational beliefs (norms) favoring commitment to improvement and a risk/control perspective have been intentionally embedded in IT governance tools such as COBIT and ITIL. This study explores the connection between these norms and IT quality, developing and testing survey items to assess norm adoption. Both regression and structured equation modeling results show statistically significant relationships between norm adoption, participation in norm-driven activities, and organizational IT quality. Assessing norm adoption may especially help small organizations better assess, manage, and govern information systems.

INTRODUCTION

The IT alignment literature and guiding notions of the IT governance movement might be summarized by suggesting that IT quality tends to improve when an organization competently and appropriately tailors technical components to its specific context and goals. IT management and governance tools operationalize this paradigm by prescribing practices - often in the form of controls - which can help organizations develop and assure organizational IT effectiveness. Although IT governance tools such as COBIT (IT Goverance Institute (ITGI), 2007, 2008; Ridley, Young, & Carroll, 2004; Tuttle & Vandervelde, 2007; Van Grembergen, De Haes, & Amelinckx, 2003) and ITIL (Cartlidge et al., 2007; Cater-Steel, Toleman, & Tan, 2006; Duffy & Denison, 2008; Dugmore & Taylor, 2008; ITGI, 2008) are increasingly being adopted with good effect, the mechanisms by which such efforts contribute to success are less well understood. This study explores how the IT beliefs an organization adopts affect IT quality.

Given constant and rapid evolution of information technology, Simons's question "How do managers control the search for opportunities?" (Simons, 1995, p. 33) is relevant for IT management. Simons goes on to identify positive belief systems, driven by core values, and negative boundary systems, driven by risks to be avoided, as levers of control management can use to achieve its goals. (Simons, 1995). A belief system, as defined by Simons, is the "explicit

set of organization definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose and direction for the organization." (Simons, 1995, p. 34) IT management toolkits generally include practices and process controls focused on tangible artifacts such as component performance or administrative procedures—these are exemplars of boundary systems. Simons illustrates boundary systems by describing one manager's effort to stamp out rogue IT projects and notes that 1) people have to be induced to pay attention to boundary systems and 2) such incentives are usually punitive. On the other hand, the importance of guiding beliefs is also important. This balance between inspiring innovation and synchronizing efforts was not lost on the developers of COBIT who suggest "Culture, ethics and behaviour of individuals and of the enterprise are very often underestimated as a success factor in governance and management activities" (ISACA, 2012, p. 27).

IT governance efforts seek to manage and assess strategic IT resources so as to reduce risk and ensure investments in IT resources add value (Hall, 2011). Organizations adopt carefully specified control frameworks for both regulatory and operational reasons. Although complying with regulations consumes both time and financial resources, IT governance implementations also generate benefits such as increased productivity, net cost savings, and greater efficiency (Bergeron, Raymond, & Rivard, 2004; Chan, 2002; De Haes & Van Grembergen, 2008b; Henderson & Venkatraman, 1993; Reich & Benbasat, 2000; Venkatraman, 1989b). We observe that, in addition to identifying useful technical and organizational components, prescribing best-practice procedures, and focusing on delivery processes, the patterns of expression (tables, figures, and organizational paradigms) selected by the experts who created COBIT and ITIL intentionally express underlying normative principles or norms believed to be associated with increased IT quality and improved IT outcomes. Adopting specified practices can improve operations and fostering organizational adoption of the belief system underlying those practices also contributes to the success of IT management and governance efforts.

If norm adoption (presumably accomplished by moving Simons's belief systems lever) can be shown to be an effective predictor of IT quality and if a reliable and relatively inexpensive norm assessment methodology can be developed, it might prove useful in: 1) developing improved IT-function assessment tools, 2) bridging the communication gap between the IT function and other parts of an organization, 3) explaining why some IT governance initiatives are more effective than others, and 4) reducing risk and increasing IT effectiveness. Realization of these norm-based benefits might be especially relevant to smaller organizations which are less likely to adopt formal, procedure-based governance mechanisms (Albayrak, Gadatsch, & Olufs, 2009; D'Amboise & Muldowney, 1988; Ghobadian & Gallear, 1997; Huang, Zmud, & Price, 2010).

BACKGROUND

Adoption of IT Governance Frameworks

IT governance frameworks embody an effort to improve IT reliability and predictability and have been widely adopted in large enterprises, banking, and government agencies (Buchta, Eul, & Schulte-Croonenberg, 2009; Damianides, 2005). The IT Governance Institute's COBIT is the broadest of the widely adopted IT governance frameworks and is often cited as an authoritative

source in IT governance literature (ITGI, 2007, 2008; Ridley, et al., 2004; Simonsson & Johnson, 2006; Van Grembergen, et al., 2003). Other frameworks include ITIL, developed by the UK government (Cartlidge, et al., 2007), and ISO/IEC standards developed by the International Organization for Standardization (International Organization for Standardization (ISO), 2005). Related commercial frameworks have also been developed by Microsoft, HP, and IBM, among others. Despite substantial variation in the components, widely accepted frameworks have been shown to contribute to improved outcomes such as cost savings, productivity improvements, and better organizational efficiency (Bergeron, et al., 2004; De Haes & Grembergen, 2008a; Henderson & Venkatraman, 1993; Reich & Benbasat, 2000). However, smaller organizations are less likely to adopt formal, procedure-based governance mechanisms (Albayrak, et al., 2009; D'Amboise & Muldowney, 1988; Ghobadian & Gallear, 1997; Huang, et al., 2010).

Norms as Drivers of IT Quality

Broad principles regarding shared culture or beliefs and values underlie the formal procedures specified in IT governance and management frameworks. An underlying pattern of normative principles was also noted when several decades of Total Quality Management (TQM) best practices were abstracted into 12 essential normative constructs. (Ahire, Golhar, & Waller, 1996) Generally accepted or social norms can be effective IT behavioral influencers (Axelrod, 1986; Rogers, 1976). Similarly, a recent study of the antecedents of compliance with organizational security policies by (Bulgurcu, Cavusoglu, & Benbasat, 2010) found that normative beliefs and self-efficacy significantly affected employee intent to comply. In short, the connection between organizational culture and IS management has been studied and established. (Smit & Dellemijn, 2011).

We suggest that some of the benefits attributed to IT governance result from organizational adoption of norms and are independent of the direct effect of formally managed IT processes and procedures. For example, whereas compliance with a password policy may demonstrate that a user perceives strong passwords to be a part of laudable efforts to reduce organizational risk, compliance may also simply be inevitable given a system-enforced parameter or merely represent a rational choice not to incur the wrath of the IT group. Organizational adoption of a more abstract risk/control perspective for IT may help mitigate other risks in ways that sanctions for rule breaking cannot. Whereas compliance with a password policy is directly observable and systematically enforceable, the wide range of protective behaviors needed to thwart social engineering attacks would be much more difficult to list or automate. Measuring norm adoption apart from rule-compliance behavior may therefore be important in achieving and tracking IT process improvement.

The Humean Theory of Motivation (HTM) is based on David Hume's argument that actions are motivated by a belief and desire pair (Cohon, 2010; Hume, 1978; Radcliffe, 2010; Smith, 1987). Based on the HTM we postulate that motivation to act in compliance with IT initiatives is partially driven by a belief that one's actions make a contribution combined with a desire to see better quality IT outcomes. Furthermore, according to the Cognitive Theory of Motivation (CTM) actions become normative behaviors when they are intellectually evaluated as superior to other choices (Garrard & McNaughton, 1998; McNaughton, 1988). Adapting these ideas for IT management, we differentiate organizational adoption of IT effectiveness norms by focusing on

shared values, beliefs, and desire rather than considering only behavior, such as procedural compliance. IT effectiveness norms guide organizational and individual actions when actors believe chosen activity patterns are superior to alternatives in meeting shared values.

1) Shared values – While HTM and CTM consider individual action, we are taking an organizational perspective. Thus, for our IT norms, the proposition, "I believe these actions are in my best interest" becomes "We believe these actions are in the best interest of the organization."
2) Beliefs—Potential actors (people in an organization) associate patterns of action with organizationally shared values.
3) Desires—Potential actors have a predilection to bring about value-aligned results.

Thus, our conceptual paradigm is that when IT norms have been adopted by an organization, shared values motivate action based on the belief that such action will result in better (more desirable—higher quality) IT outcomes. Adopted IT norms, then, influence how an organization approaches or views IT whereas beliefs intellectually connect norms to expected results.

RESEARACH OBJECTIVES AND QUESTIONS

To explore the value of an IT norms paradigm, we address these research objectives/questions:

Objective 1: Develop an initial of list differentiated, widely applicable IT norms.
Objective 2: Develop survey items that assess levels of norm adoption.

Question 1: Does organizational adoption of IT norms increase willingness to act in accordance with those norms?
Question 2: Does norm adoption and/or increased willingness to act result in better IT quality?

Differentiated and Widely Accepted IT Norms

An ideal list of norms to be used in assessing IT would be relatively easy to assess, understandable for a variety of stakeholders, and strongly predictive of IT success. To achieve our first research objective we began with COBIT and ITIL and reviewed existing literature. We sought to identify differentiated constructs which would be intuitively satisfying to the practitioners who would be surveyed. These characteristics are important because amorphous (less differentiated) constructs or ones that did not ring true with practitioners would have less communication and diagnostic value. Further, a manager who identifies a low level of adoption should find the norms understandable and believable so as to effectively formulate messages and actions that reinforce a productive belief system. Because this work is preliminary, we aimed to validate the general idea that norms assessment has predictive power over IT quality before investing in the development of more nuanced or complex norm constructs.

Problematically, the widely recognized notion of strategic IT alignment is a complex or perhaps amorphous construct made up of other theoretical components (Bergeron, et al., 2004; De Haes & Van Grembergen, 2008a; Henderson & Venkatraman, 1993; Reich & Benbasat, 2000). Luftman (2000) demonstrates this complexity by separating alignment into 12 components and

proposing a maturity model approach which entails many continuous improvement notions. To assess alignment or fit a respondent must coordinate understanding of businesses goals with an understanding of what organizational IT systems do and then make a judgment as to the appropriateness of the alignment between those two factors. This makes organizational IT alignment relatively difficult to measure and has resulted in exploration of a wide variety of measurement and analysis models (Jouirou & Kalika, 2004; Venkatesh & Goyal, 2010; Venkatraman, 1989a). It might also be said that alignment is as much the result of an effective belief system as it is a driver of IT quality. That is, alignment maybe the result of good practices and belief systems as much as it is a driver of success. After careful consideration of existing alignment metrics, we chose to focus on constructs which are more specific than alignment and likely to be either components or drivers of the extensively researched alignment paradigm.

Norms from IT Governance Frameworks

A careful study of COBIT's conceptual framework in light of management concerns and auditor practices recommends COBIT as the basis for development of a general theory of internal control (Tuttle & Vandervelde, 2007). Created by the IT Governance Institute, COBIT is considered the broadest of the widely adopted IT governance frameworks and is cross-referenced and cited as an authoritative source in the ISACA (Information Systems Audit and Control Association) IS audit guidelines which form the base of accepted practice for the IT audit community. Thus, we consider COBIT to be a credible repository of normative ideals. Space does not allow for an extensive treatment of our analysis of the COBIT document but, in summary, we reviewed the supporting documentation, organizational structure, and presentational elements of COBIT classifying explicit or implicit normative messages. Three clear themes emerged: a) control - messages highlighting a risk and control perspective, b) track - messages calling for detailed assessment or record keeping, and c) align - messages calling for alignment between organizational mission and IT or for coordination among IT processes. Organizations that have adopted the spirit of IT governance as advocated in COBIT can, therefore, be distinguished from other organizations in that they employ:

1. A risk and control perspective for IT where risks are assessed and controls that detect and or reduce problematic factors are implemented,
2. A commitment to systematic measurement of IT processes as a facilitator of improvement in IT operations, and
3. A focus on having IT processes address organizational goals.

The value of these notions as drivers of IT quality is not surprising in light of previous literature. We note a close correlation between a risk/control perspective and Simons's boundary systems as well as an affinity between his noted search for opportunities and a continuous improvement focus. Together these norms are part of a generalized IT success belief system. As previously noted, the Align theme is widely accepted but has also been identified in the research literature as difficult to assess. Therefore we selected risk/control perspective and commitment to systematic improvement as a useful synthesis of the messages found in COBIT's substance and structure. While we do not claim that these are the only identifiable norms we do suggest that these two beliefs are differentiated and widely accepted and thus useful for this study.

Risk management is both important for today's organizations and evident in COBIT. Risks can relate either to negative outcomes or to the absence of positive outcomes. Thus, both system failure resulting in lost sales and the inability to enter a new market because IT systems cannot grow or change quickly enough would be risks. An organization which purposefully manages risk will likely be more successful than one which only emphasizes risk response. A risk/control focus is especially important for IT auditing. Many COBIT processes and control objectives include the word risk, e.g., PO9 Assess and manage IT risks and AI1.2 Risk analysis report. The notion of identifying and controlling risks is also fundamental for establishment of the detailed control objectives which describe specific outcomes to be sought or avoided.

Performance measurement and continuous improvement are also widely supported in IT governance frameworks. The value of measuring process efficiency and effectiveness is supported by many general management practices cited in IT Governance Institute materials. Specific goals and metrics presented are proposed for each IT process in COBIT. Metrics for assessing processes are expressed in maturity models; level 5 optimized processes are characterized by continuous improvement mechanisms. The continuous improvement approach is also fundamental in the organizational paradigm of the four COBIT domains: the IT function delivers value by planning and organizing, by acquiring and implementing, then by delivering and supporting, and finally by monitoring and evaluating. This improvement cycle reflects the well-known DMAIC and DMADV cycles from the more general quality and business process improvement literature (Eckes, 2005; George, 2002; Persse, 2006; Przekop, 2006). Although space does not allow for evidence, we assert that ITIL, ISO, and other frameworks also advocate for the importance of measurement in support of continuous improvement.

MODEL AND SURVEY INSTRUMENT

We propose that appropriate organizational adoption of the norms implicit in widely accepted frameworks will result in improved IT performance. This effect is delivered to the organization through two mechanisms as modeled in Figure 1.

1. Hypothesis H1: increased levels of norm adoption improve IT quality. Shared values and paradigms (norms) adopted by an organization and its members can shape tactical decisions about how to interact or deploy IT in support of organizational goals.

2. Hypothesis H2: increased organizational adoption of IT effectiveness norms increases participation in norm-driven activities. Norm-driven activities are IT process activities and are usually specified in policies, procedures, and metrics.

3. Hypothesis H3: higher participation in norm-driven activities results in better IT quality.

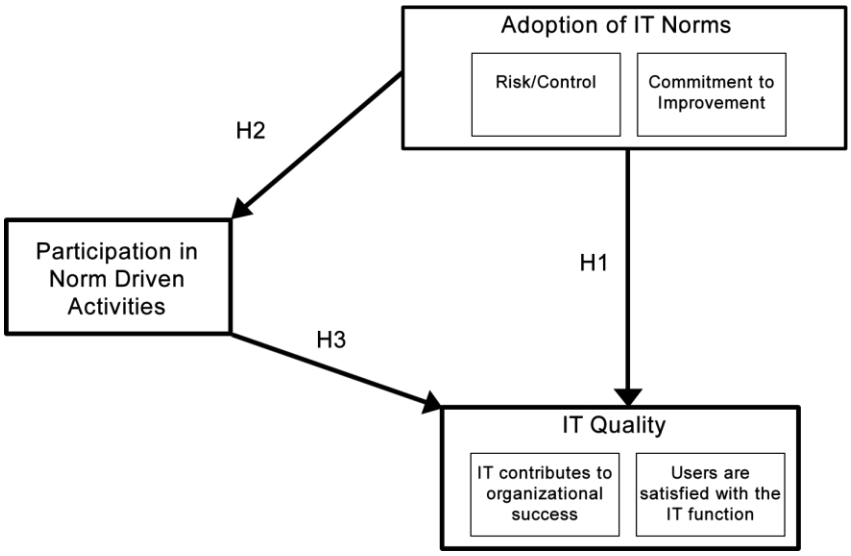

Figure 1. Modeling Connections Between IT Effectiveness Norms and IT Quality.

Norm Adoption Questions

To test this model, we developed a set of survey items to assess 1) the degree to which an organization has adopted the identified IT effectiveness norms, 2) participation in norm-driven activities, and 3) IT quality. The items were cast in the form of 7-point, strongly agree to strongly disagree Likert scales with an additional not sure option. Emphasizing the previously described norms paradigm (actors believe that chosen activity patterns are superior to alternatives in meeting shared values), all the items include direct references or obvious implications related to the intention to act in a manner associated with the norm. We preliminarily tested several iterations of pilot questions, removing and adapting weaker items.

Table 2 lists survey items intended to assess organizational adoption levels for the risk/control perspective and commitment to measurement and improvement norms. RC_3 was adapted from previous work designed for interviewing business executives (Reich & Benbasat, 1996).

Norm	Item
	Risk/Control Perspective
RC_1	Our IT systems and practices help us avoid making mistakes and/or prevent operational problems.
RC_2	We take action to try to avoid future IT-related problems.
RC_3	IT operations are organized to support the timing of key events on our organization's business calendar.
	Measurement / Improvement
IMP_1	Our organization records specific events or activities to assess whether or not our IT is doing a good job.
IMP_2	Our organization routinely monitors the effectiveness of our IT systems.
IMP_3	Appropriate people in our organization receive and accept feedback on the effectiveness of our IT.

Table 2. Survey Items Assessing Adoption of IT Effectiveness Norms.

Table 3 lists items designed to assess organizational participation in norm-driven activities. IT process activities usually involve organization-specific technical artifacts such as policies, procedures, or equipment. Since these survey items are intended to be useful for a broad spectrum of organizations, included technical components need to be almost universally used or understood. The items in Table 3, each of which includes both organizational references and technical artifacts, are intended to proxy for more organizationally tailored questions that include technologies or governance-related initiatives within a specific organization.

ACT_1	Non-IT people in our organization actively participate in the improvement of our IT systems.
ACT_2	People in our organization gladly comply with efforts to safeguard and improve our IT operations.
ACT_3	People in our organization recognize the need to have and safeguard strong passwords for access to IT systems.
ACT_4	People in our organization understand the need for and are willing to follow policies that restrict the use of computers.

Table 3. Participation in Norm-driven Activities.

Our model's IT quality variable was assessed using the items listed in Table 4. The IT success items were selected after reviewing previous work in the IT assessment literature. Four of the items (OS_1 – OS_4) come from (Jouirou & Kalika, 2004). IT user satisfaction (US_6 and US_7) has a long history as a dependent variable in IT evaluation studies (DeLone & McLean, 1992; DeLone & McLean, 2003). Items US_6 and US_7 are similar to those used in many other survey instruments. The two quality components, *IT contributes to organizational success* and *Users are satisfied with IT function*, were expected to correlate, but testing similar hypotheses against each of these dependent variables serves as a robustness check.

Category	Item
	IT Contributes to Organizational Success
OS_1	IT has increased our organization's capacity for innovation.
OS_2	IT helps our organization better support the needs of our customers.
OS_3	IT helps our organization manage costs.
OS_4	Our IT has improved productivity in our organization.
	Users are Satisfied with IT Function
US_6	I am satisfied with our organization's IT services.
US_7	People in our organization are generally satisfied with our IT services.

Table 4. IT Quality Survey Items.

In addition to the items listed above, the survey contained several questions to provide data for potentially relevant respondent characteristics. For example, we asked about involvement in IT, the size of the organization and IT function, and the proximity of respondents to their IT support workers. These items were tested but did not prove to affect the analysis presented here and were, therefore, omitted due to space considerations.

We invited 800 members of the Natural Areas Association (NAA) to participate in the survey. The NAA advances the preservation of natural diversity and works to identify, protect, manage, and study natural areas across landscapes and ecosystems. The NAA has a diverse membership

that includes government and NGO land and resource managers, conservationists, biologists, ecologists, researchers, land trusts, educators, and students, as well as other individuals involved in the conservation and management of natural areas. The research goal of discovering how to better achieve positive IT outcomes would be important to these organizations as they seek to more efficiently accomplish a wide variety of organizational goals. The NAA agreed to invite members to participate in the survey in an effort to increase the response rate. Filtering out surveys with few or obviously useless responses (e.g., answering neither agree nor disagree to every question) left us with 86 useable responses. We have no reason to believe that drawing respondents from organizations who have elected to join NAA will systematically bias the results.

RESULTS

We analyzed the data with two main questions in mind: 1) Do the data support the validity of the items and constructs listed in Tables 2-4? and 2) Do the data support our theoretical model associating norms with IT success? To assess item validity, we applied principal component analysis on the survey's norm adoption and activity participation items. Our hypotheses were tested using regression of the resultant component variables

Principal Component Analysis of the Norms Items

The six norm assessment items (RC_* and IMP_*) consistently separated into two components as expected a shown in Table 5. All items except IMP_3 loaded into clearly differentiable constructs, and even IMP_3 was dominantly loaded in the expected component.

Item		Components	
		1	2
Risk/Control Perspective Component			
RC_1	Our IT systems and practices help us avoid making mistakes and/or prevent operational problems.	.763	.150
RC_2	We take action to try to avoid future IT-related problems.	.809	
RC_3	IT operations are organized to support the timing of key events on our organization's business calendar.	.688	.355
Commitment to Improvement			
IMP_1	Our organization records specific events or activities to assess whether or not our IT is doing a good job.		.824
IMP_2	Our organization routinely monitors the effectiveness of our IT systems.	.122	.772
IMP_3	Appropriate people in our organization receive and accept feedback on the effectiveness of our IT.	.492	.669
Eigenvalue cutoff = 1, Varimax rotation and Kaiser normalization, converged in three iterations, loadings < .1 omitted			

Table 5. Rotated Component Matrix Loadings for the Norm Items.

The basic scale provided for items ranged from 1 (strongly agree) to 7 (strongly disagree). Non-responses to norm-based items (RC_* and IMP_*) were coded as values of 8. This differs from

the common practice of replacing missing values with average values which was used for the ACT_*, OS_*, and US_* items. However, we applied a more conservative approach and coded respondents not responding to a question describing norm adoption, to imply that they did not meet our assent/shared value/intent to comply definition.

Principal Component Analysis of the Dependent Variable Items

Table 6 shows the results of the PCA of the responses to the IT Quality (OS_* and US_*) and Participation in IT norm-driven activities (ACT_*) items. The loadings correspond reasonably well with the theoretical expectations of the three components. The first component included all four of the *IT Contributes to Organizational Success* (OS) items but also featured the highest loading for one of the questions considered part of the *Participation in Norm-Driven Activities* (ACT) construct. Notably, the secondary loading for this item was as expected. The two *User Satisfaction* (US) items loaded most strongly together in the second component. The remaining ACT items loaded primarily into the third component.

OS = IT Contributes to Organizational Success US = User Satisfaction ACT = Participation in Norm-Driven Activities		Component		
		1: OS	2: US	3: ACT
OS_1	IT has increased our organization's capacity for innovation.	.817	.325	.129
OS_2	IT helps our organization better support the needs of our customers.	.790	.209	
OS_3	IT helps our organization manage costs.	.760	.299	
OS_4	Our IT has improved productivity in our organization.	.755	.429	.133
ACT_1	IT people in our organization actively participate in the improvement of our IT systems.	.686		.322
US_1	I am satisfied with our organization's IT services.	.252	.902	.152
US_2	People in our organization are generally satisfied with our IT services.	.311	.886	.168
ACT_2	People in our organization understand the need for and are willing to follow policies that restrict the use of computers.		.124	.883
ACT_3	People in our organization recognize the need to have and safeguard strong passwords for access to IT systems.	.168		.843
ACT_4	People in our organization gladly comply with efforts to safeguard and improve our IT operations.	.301	.482	.667
Eigenvalue cutoff = 1, Varimax rotation and Kaiser normalization, converged in five iterations, loadings < .1 omitted				

Table 6. Rotated Component Matrix for Dependent Variable Items.

In summary, the PCA results validate our survey items associated with norms, norm-based activities, IT quality, and IT user satisfaction, in the sense that they load consistently on the predicted components.

Testing Hypotheses using Linear Regression

Composite construct variables were computed for each respondent based on the component loadings shown in Tables 5 and 6 including: *IT Contributes to Organizational Success* (OS—4 items), *User Satisfaction* (US—2 items), *Participation in Norm-Driven Activities* (ACT—4 items), *Risk/Control Perspective* (RC—3 items), and *Commitment to Improvement* (IMP—3 items). Hypotheses testing and regression results are listed in Figure 2 and Table 7.

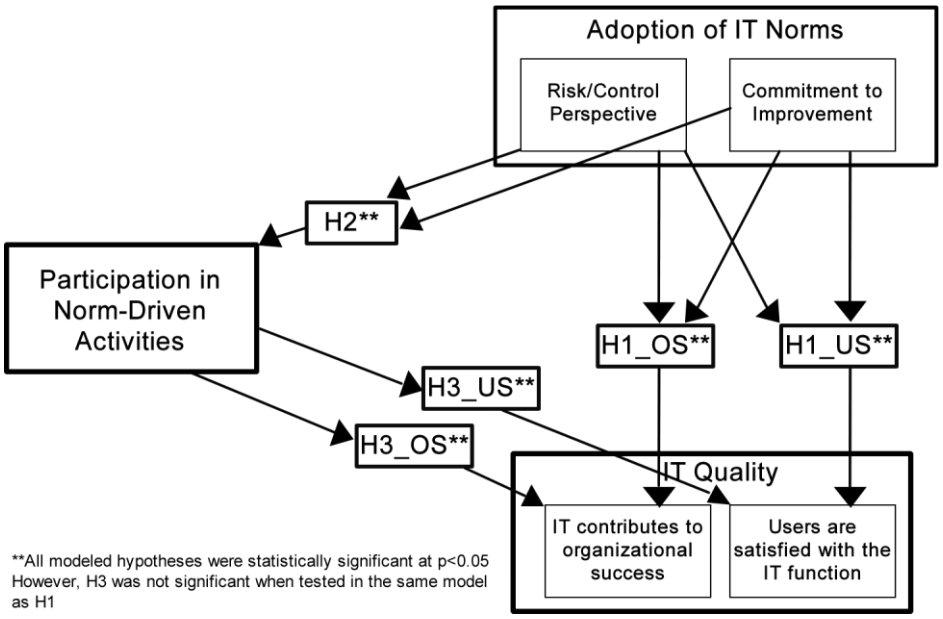

Figure 2. Significance Test Results for Modeled Hypotheses.

Almost all hypothesized relationships were shown to be statistically significant at the p<.05 level. The three regression models labeled H1_OS, H1_US, and H2 each used both norm composites (PC and IMP) as independent variables. The H2 test demonstrated a significant relationship between norm adoption and participation in norm-driven activities (ACT). And, by evaluating both H1_OS and H1_US versions of the original hypothesis H1 (norms drive IT quality) we conducted a robustness test whereby two variations of IT quality were considered. In H3_OS and H3_US a similar approach showed a significant relationship between participation in norm-driven activities (ACT) and each of the IT quality measures. The explained variance for H1 (norms drive quality) was higher than the explained variance for H3 (participation in norm-driven activities drives quality). The IT quality results for H3, however, were not significant when tested with the norm and participation variables (RC, IMP, and ACT) in H1_H3_OS and H1_H3_US. Still, with a p-value of .15 the association between ACT and OS was nearly significant even in the combined model; see H1_H3_OS in Table 7. For completeness, we summed RC and IMP into one variable and the two success measures into another creating a three-component model. Significance results for each of the main hypotheses H1, H2, and H3 were consistent with the more detailed tests shown in Table 7.

Hypothesis	Coefficient / p-value			Adjusted R^2	Intercept / Intercept p-Value
	RC	IMP	ACT		
Higher levels of norm adoption drive higher levels of IT quality as assessed in IT's contribution to organizational success (H1_OS) , user satisfaction (H1_US), and participation in norm-driven activities (H2)					
	RC	IMP		Adjusted R^2	Intercept
H1_OS	.619 / .000**	.273 / .000**		.416	.037 / .680
H1_US	.614 / .000**	.342 / .000**		.398	.048 / .575
H2	.412 / .000**	.451 / .000**		.323	.062 / .512
Higher levels of participation in norm-driven activities (ACT) drives higher levels of IT quality as assessed in IT's contribution to organizational success (H3_OS) and user satisfaction (H3_US)					
			ACT	Adjusted R^2	Intercept
H3_OS			.500 / .000**	.237	.024 / .815
H3_US			.419 / .000**	.162	.026 / .803
Norm adoption (RC & IMP) and participation in norm-driven activities (ACT) drive higher levels of IT quality as assessed in IT's contribution to organizational success (H1_H3_OS) and user satisfaction (H1_H3_US)					
	RC	IMP	ACT	Adjusted R^2	Intercept
H1_H3_OS	.607 / .000**	.231 / .033**	.231 / .150	.487	.075 / .386
H1_H3_US	.687 / .000**	.387 / .000**	.040 / .693	.491	.125 / .141
RC: Composite variable from the Risk/Control Perspective items IMP: Composite variable from the Commitment to Improvement items ACT: Composite variable from the Participation in Norm-Driven Activities items ** Statistically significant at the p<.05 level					

Table 7. Linear Regression Results. Rows Represents Testing of a Different Hypothesis.

Confirmatory Factor Analysis and Structured Equation Modeling

To confirm the results of our data analysis, we performed both a CFA and SEM maximum likelihood path analysis of our theoretical model using AMOS version 16. Additional data refinement steps were made to better satisfy the continuous normally distributed assumptions these methods depend upon. Refinements to responses included replacing five missing values with neutral (neither agree nor disagree) values, and 17 cases with extreme responses (one case had more than 10% of responses at the most extreme values) were removed leaving 69 responses. Refinements to variables included analysis of their response distributions and versions of each CFA and SEM model were created with and without two questions (RC_1 and OS_2) which had a skew and kurtosis ≥ 1. The tests of absolute and relative fit were higher without these questions in the model, so they were removed from the analysis. Finally one (ACT_1) of four questions in the participation in norm-driven activities (ACT) construct prevented any solution from being computed until it was also removed. While these modifications suggest that changes to the design of three questions are needed, the difficulty in converging on a solution with these questions and the 17 extreme responses is more likely a reflection of the small sample size. Our sample to theoretical construct ratio of 23:1 exceeds commonly suggested minimums of 10:1 or 20:1, although models using relatively small samples (such as ours) with high degrees of freedom can have lower absolute fit indicators and prevent solutions from being reached (Jackson, 2003). A larger sample may have allowed the omitted cases and questions to be fit to a theoretical model.

Norm Adoption was constructed reflectively from the RC_3,2 and IMP_* variables which were allowed to co-vary. Participation in IT norm-driven initiatives was constructed similarly from

ACT_2-4 and IT Quality from OS_1,2 and US_* variables. When constraints were necessary to reduce degrees of freedom, variances were set to one. We also allowed variables to co-vary in the same construct to maximize model fit. The final SEM model with regression weights and squared multiple correlations is depicted in Figure 3 and the CFA and SEM fit statistics are reported in Table 8.

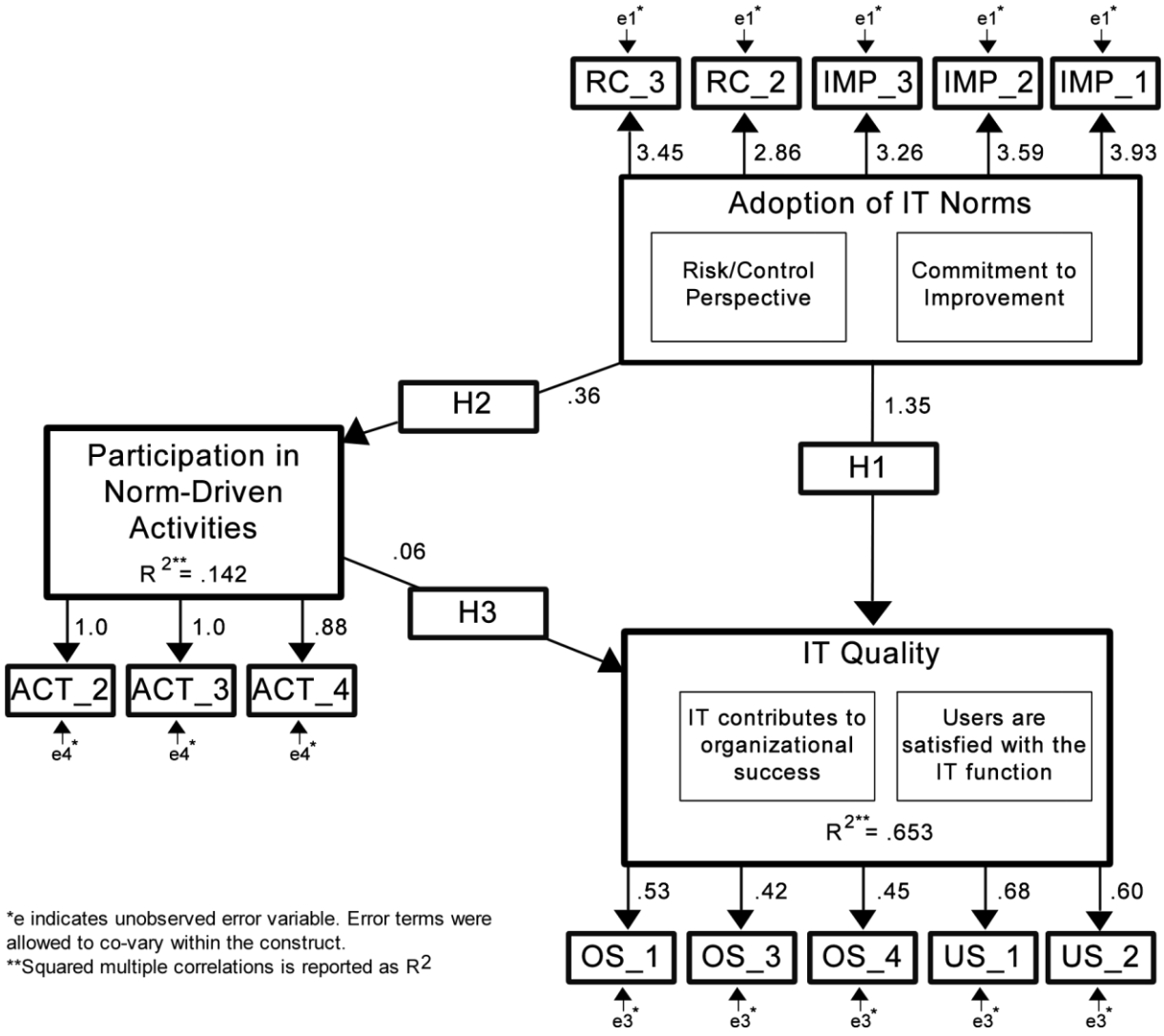

Figure 3. SEM Model – Numbers Beside Arrows Are Regression Weights.

CFA solutions were reached for all models and the descriptive index of fit, the Chi square test indicates the predicted model was consistent with the data. Absolute fit indicators CFI and TFI are within the recommended values indicating all modeled constructs are supported. Although the RMSEA for the CFA's are not within the recommended value, models with low degrees of freedom (8, 2 and 2) are known to result in RMSEA values greater than 0.1 (Kenny & McCoach, 2003).

		Model			
Indicator	**Recommended Value**	**Full SEM**	**Norm Adopt CFA**	**Participate in Norm Activity CFA**	**IT Quality CFA**
Size to construct ratio	Minimum of 20:1 or 30:1	69:3 (23:1)	69:1	69:1	69:1
Chi-square	-	74.170	13.866	3.965	4.714
Degrees of freedom (df)	-	57	8	2	2
Probability	≥0.05	.063	.085	.138	.095
CMIN (χ2/df)	0 to approx. 3, lower is better	1.30	1.73	1.98	2.35
Comparative fit (CFI)	> .90	.950	.919	.912	.983
Tucker Lewis (TLI)	Close to 1	.931	.898	.868	.913
Root mean square error (RMSEA),	< 0.08, not meaningful for models with low degrees of freedom	.067	.104	.12	.141

Table 8. Structured Equation Model and Confirmatory Factor Analysis Results.

We then combined the CFA models into a composite SEM model of all theoretical constructs incorporating the previously described modifications. A computed solution was reached with $\chi 2$ (57, N=69)=74.17, p=.063, suggesting a model consistent with the data. Absolute fit indicators (CFI=.95, TLI=.93, RMSEA=.067) also were within acceptable ranges.

DISCUSSION

This study was designed to explore the connection between adoption of identifiable IT norms and IT quality. First we sought to identify a promising; i.e., widely-accepted and differentiated, set of norms and partially validate a set of survey items to assess norm adoption levels. As described above, we identified two such norms, a risk and control perspective and commitment to improvement. The principal component and factor analyses reported in the previous section show a promising level of coherent differentiation which aligns nicely with theoretically expectations. This provides some evidence for the validity of the survey items.

Our theoretical model (Figures 1 and 2) addresses our two research questions which more directly explore the association between norm adoption, participation in norm-driven activity, and IT Quality. The model anticipates norm adoption to have both a direct (norm adoption increases quality) and an indirect (norm adoption increases participation in activities which increases quality) effect on IT success. The results, for both norms and both measures of IT quality, exhibited statistically significant associations with consequential explained variance in both the regression tests and the combined CFA/SEM analysis. Current best practices as exemplified in IT governance tools such as COBIT and ITIL implicitly require norm adoption, but given that some organizations do not find it worthwhile to initiate large IT governance efforts, our results imply that fostering the implicit norms may have a positive effect despite less systematic efforts. Further, norm adoption may be thought to drive beneficial ad-hoc decisions which might be unique to an organization or a situation and therefore difficult to include in generalized IT management tools.

Although the regressions did not identify a significant relationship between participation in specific control activities and IT quality once the direct impact of norm adoption was accounted for (see H1_H3_OS and H1_H3_US in Table 7), the combined SEM results suggest the modeled H3 relationship is acceptable and is statistically significant. Thus, we have some limited evidence that increased participation in norm-driven activities also had an additional effect on IT quality apart from norm adoption. One interpretation of the relatively small size of the H3 effect (when it is part of the larger model) is that people who comply with appropriate policies and procedures but do not as substantially adopt the IT effectiveness norms, can still contribute positively to IT quality. For example, a system-enforced password policy may make an organization incrementally more secure even if participants disagree or assign little value to this control. The additional effect of this incremental difference would be expected to be relatively small. Also, as previously noted, the norm-driven activity items in this instrument are necessarily generic so as to be workable for nearly any organization. Even when systematic IT risk management is implemented, such activities are likely to be different in different organizations. Thus, survey items which are more closely tailored to IT controls in specific organizations might be more effective in assessing the relative impact of the constructs.

CONCLUSIONS AND FUTURE WORK

The norm-based view of IT governance developed here may be useful in explaining how the effects of IT management initiatives are carried through organizations. Our assessments of organizational participation in norm-driven IT initiatives were limited by a lack of organizational specificity. However, while much of the effect of participation was captured by our norm-adoption constructs, willingness to participate was shown to be a significant, if incremental driver of IT quality. Our identified norms, a risk/control perspective and commitment to improvement, will sound familiar to readers of the IT alignment and quality management literature, but still represent only a starting place for a more systematic, norm-based analysis. The impact of organizational adoption of these norms seems worthy of additional study.

Because the identified norms can be assessed and expressed using relatively non-technical terms, a norm-based approach to IT governance promises to bridge some important communication gaps. Norm-based assessment tools can be shared by both IT professionals and other managers in an organization. This is in contrast to procedures which ask an auditor to apply specific technical knowledge in assessing the adequacy of specific IT process controls. Although specific technical measures are valuable, our results suggest that fostering adoption of appropriate IT norms can substantially contribute to an organization's ability to achieve IT success. Assessing norm adoption may help in diagnosing less-effective IT efforts and in guiding IT improvement (especially in small organizations) and some measure of norm adoption could have a place in IT audits intended to assess the success of IT management.

Because the survey items loaded coherently and fit properly into the expected relationships, they are promising as a starting point for future work. Although our SEM fit was at the margins of significance, a larger data set might provide more convincing evidence. Follow-up conversations can be conducted with survey respondents to refine the survey items. Interviews with multiple people within an organization might help distinguish between organizations that adopt the norms

and people in organizations who adopt them. A longitudinal study would shed more light on the timing of adoption and improvement. A more extensive study focused on small organizations is also in order because a norm-based approach to IT governance is especially promising in that context. These efforts can lead to an instrument appropriate for diagnosing IT organizations so as to suggest improvements that can be understood by both IT practitioners and non-IT managers and lead to improved business results.

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